

What is claimed is:

1 1. A method for reducing power requirements for a
2 microprocessor, the steps comprising:

3 a) providing within a microprocessor at least one
4 datapath resource whose size may be dynamically altered;

5 b) dynamically estimating a size requirement for
6 said at least one datapath resource responsive to a need
7 therefore by a program being executed within said
8 microprocessor;

9 c) dynamically altering the size of said at least
10 one datapath resource responsive to said size requirement
11 estimate; and

12 d) reducing power consumption from an unused portion
13 of said at least one datapath resource.

1 2. The method for reducing power requirements for a
2 microprocessor in accordance with claim 1, wherein said at
3 least one datapath resource comprises discrete resource units.

1 3. The method for reducing power requirements for a
2 microprocessor in accordance with claim 2, wherein said at
3 least one datapath resource may have at least one of said
4 discrete resource units allocated thereto and deallocated
5 therefrom.

1 4. The method for reducing power requirements for a
2 microprocessor in accordance with claim 1, wherein said
3 dynamically estimating step (b) comprises using sampled
4 estimates of said need for said at least one datapath resource
5 by said program being executed.

1 5. The method for reducing power requirements for a
2 microprocessor in accordance with claim 4, wherein said
3 sampled estimates comprises periodic measurement within at
4 least one update period of said need for said at least one
5 datapath resource by said program being executed.

1 6. The method for reducing power requirements for a
2 microprocessor in accordance with claim 5, wherein said update
3 period is determined by at least one of the methods:
4 dynamically determined, and predetermined.

1 7. The method for reducing power requirements for a
2 microprocessor in accordance with claim 1, wherein said
3 dynamically altering step (c) comprises at least one of the
4 sub-steps: allocating at least one additional discrete
5 resource unit to said at least one datapath resource, and
6 deallocating at least one discrete resource unit from said at
7 least one datapath resource.

1 8. The method for reducing power requirements for a
2 microprocessor in accordance with claim 1, wherein said at
3 least one datapath resource comprises a resource used as a
4 FIFO queue.

1 9. The method for reducing power requirements for a
2 microprocessor in accordance with claim 1, wherein said at
3 least one datapath resource comprises at least one of the
4 resource types: an IQ, an LSQ, an ROB, a PRF, and an RF.

1 10. The method for reducing power requirements for a
2 microprocessor in accordance with claim 7, wherein said at
3 least one resource unit is allocated more rapidly than said at
4 least one resource unit is deallocated

1 11. The method for reducing power requirements for a
2 microprocessor in accordance with claim 7, wherein said
3 dynamically altering step (c) comprises the sub-step:
4 deallocating at least one discrete resource unit from said at
5 least one datapath resource, and wherein said deallocating
6 sub-step is performed substantially at an end of said update
7 period.

1 12. The method for reducing power requirements for a
2 microprocessor in accordance with claim 7, wherein said
3 dynamically altering step (c) comprises the sub-step:
4 allocating at least one discrete resource unit to said at
5 least one datapath resource, and wherein said allocating sub-
6 step is performed substantially during said update period, and
7 wherein said update period is terminated upon completion of
8 said allocating said at least one discrete resource unit .

1 13. The method for reducing power requirements for a
2 microprocessor in accordance with claim 12, wherein said sub-
3 step of allocating at least one discrete resource unit to said
4 at least one datapath resource, comprises starting a new
5 update period.

1 14. The method for reducing power requirements for a
2 microprocessor in accordance with claim 4, wherein said
3 statistical analysis of said need for said at least one
4 datapath resource is performed in an estimation interval.

1 15. The method for reducing power requirements for a
2 microprocessor in accordance with claim 1, the steps further
3 comprising:

4 e) using said size requirement estimate to
5 dynamically control a rate of instruction dispatch in
6 said microprocessor.

1 16. The method for reducing power requirements for a
2 microprocessor in accordance with claim 1, the steps further
3 comprising:

4 e) using said size requirement estimate to
5 selectively adjust a clock rate to at least one of the
6 microprocessor components: instruction cache, an
7 execution unit, clusters of registers, function units,
8 and other microprocessor component.